Characterising the late prehistoric, "Romano-British" and medieval landscape, and dating the emergence of a regionally distinct agricultural system in South West Britain.

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Abstract

Palaeoenvironmental evidence for the character of lowland cultural landscapes during the last 2,500 years in Britain is poorly understood, owing to a combination of an over-reliance on data from upland sequences, and because lowland mires are typically located in positions marginal to areas of settlement and agriculture. This paper presents an attempt to derive environmental evidence for this time period from a lowland context in order to characterise the key periods of change and continuity in the lowlands. The study focuses on mid-Devon, in South West Britain, and uses small pollen sites which are embedded within the historic landscape. The South West is a particularly poor region for lowland environmental data, and has until now been reliant on upland sequences. The results show that continuity, rather than abrupt change, has characterised the landscape from the later Iron Age to the early medieval period (around cal AD 800). There is no palynologically distinct Roman period in the data, contrary to evidence from the high uplands of Exmoor that suggests a decline of the agricultural system during the immediate post-Roman period. Around cal AD 800 there is a change in the agricultural system from predominantly pastoral

activities to one that led to relatively high proportions of cereal pollen appearing in the sequences, which is interpreted here as marking the onset of convertible husbandry, a regionally distinct agricultural system which is recorded from AD 1350, but whose origins are not documented. This agricultural system remained in place until the post-medieval period, when the predominant agricultural regime returned to pastoralism around AD 1750. The data clearly show discrepancies between the high uplands and the lowlands, demonstrating the potential hazards of extrapolating upland sequences to lowlands environments.

Keywords: PALYNOLOGY, ROMAN, MEDIEVAL, AGRICULTURE, CONTINUITY

Introduction

Within British palaeoecology there is a general spatial bias towards upland vegetation sequences, and as a consequence the vegetation history and landscape development of lowland areas is less-well documented than upland areas (Brown, 1999; Edwards, 1999). There is also a general temporal bias of pollen sequences, which tend to cluster in the prehistoric period (Edwards, 1979), and as a consequence the present level of knowledge of the vegetation patterns during more recent periods requires attention (Dark, 2000). Our understanding of the environment of the last two millennia is, therefore, often patchy, and for the lowlands relies upon extrapolation and interpolation from a small data set of predominantly upland pollen sequences. This paper aims to test a regional model of landscape change for South West Britain over the last 2,500 years derived from upland sequences against new data collected from four lowland pollen diagrams. The types of pollen sites used in this study are not "traditional" pollen sequences, that is lakes, raised mires or blanket peats; rather, they are small spring-fed mires and fens, which have survived destructive agricultural processes and historic peat cutting to preserve an environmental record of the last 2,500 years.

Understanding the development of the vegetation and landscape of the South West through late-prehistory and the historic period is important for several reasons. First, the South West peninsula was located at the periphery of Roman Britain, during which time the landscape showed distinct regional variation (Jones & Mattingley, 1990), and the lack of evidence for significant Romanisation outside the immediate hinterland of the *civitas* capital *Isca Dumnonium* (Exeter) suggests that this region should show greater continuity into and through the Roman period than the more Romanised south and east of Britain. Second, during the later first millennium AD, the South West was beyond the limits of Anglo-Saxon colonisation and then also lay outside the area that saw the creation of landscapes characterised

by nucleated settlements (villages) and open fields around the end of the 1st millennium AD (Rippon, forthcoming; Roberts & Wrathmell, 2000). In contrast, during the medieval period, the South West was characterised by a regionally distinct pattern of more dispersed settlements and more varied and complex field systems, the origins of which, and their relationship to the late prehistoric landscape, are unclear.

Upland model of vegetation change in South West England

Until recently evidence for the late-prehistoric and historic environment of South West Britain has been almost entirely reliant on the upland blanket mire sequences on Dartmoor (Caseldine, 1999) and Exmoor (Moore *et al*., 1984; Francis & Slater 1990; 1992), the results of which have been interpolated to the surrounding lowlands (e.g. Dark, 2000). The uplands are all characterised by open landscapes by late prehistory, and the few lowland pollen sequences dated to this period also suggest that these areas were also predominantly open landscapes by this time, for example at Sourton Down immediately north of Dartmoor (Weddell & Reed, 1997) and at Bow in mid-Devon (Caseldine *et al.*, 2000). On Dartmoor there is little archaeological evidence for any permanent human presence on the upland from the Late Iron Age and through the first millennium AD, with expansion of settlement onto the upland fringes not occurring until the "high medieval" period from the mid-13th century AD (Allen, 1994). The pollen evidence from Dartmoor for this period is sparse, but generally supports this model, in particular the data from Okehampton Park (Austin *et al*., 1980), Hound Tor (Austin & Walker, 1985) and Tor Royal (Gearey *et al.* 1997). Prior to this expansion in the mid-13th century the upland appears to have been utilised for seasonal grazing, maintaining an open grassland environment. On Exmoor, the evidence for late-prehistoric settlement is limited to a series of enigmatic monuments known as "hill-slope enclosures", the function and temporal range of which is poorly understood (Riley &

Wilson-North, 2001). Dated archaeological evidence for the Romano-British rural landscape, and in particular the post-Roman period, is practically non-existent, though analogy with lowland Devon (e.g. Hayes Farm: Simpson *et al*., 1989; Raddon: Gent and Quinnell, 1999), and Cornwall (Quinnell, 2004) suggests that the tradition of enclosed settlement may have continued into the early medieval period. The environmental evidence from Exmoor has been limited to the blanket mires on the highest upland areas, such as the Chains (Moore *et al*., 1984), Hoar Moor and Codsend Moor (Francis & Slater, 1990; 1992). These sequences generally concur with the data from Dartmoor, with low-grazing pressure through the late-prehistoric and Romano-British period, with possible abandonment of the upland during the 5-6th centuries AD leading to regeneration of scrubby woodland (Moore *et al.*, 1984), followed by little expansion or change until the mid-13th century AD.

Study Area and Methods

The approach employed in this paper is to identify similarities and differences between four local vegetation and landuse histories within a discrete area in Mid Devon (Figure 1), and provide a detailed landscape history for this lowland cultural landscape. Of great importance to the interpretation of all the sites is that they lie within areas of the "historic landscape" (i.e. the present pattern of fields, roads and settlements) that date back to the medieval period, in contrast to the majority of pollen sequences that have been recovered from high upland locations that lay beyond the areas of medieval occupation and that would have simply been used for rough grazing. The types of sites used are small (typically 30 m wide), which means they should accurately reflect their local and extra-local vegetation patterning, with a much smaller regional component than the upland blanket mires (Jacobsen & Bradshaw, 1981; Sugita, 1994). Four sites have been used in order to avoid the potential problems of over-

representation of on-site vegetation patterns, rather than the immediate surrounding landscape: by comparing the four sequences this effect should be obvious in any of the pollen sequences.

The sites lie in Mid Devon around Rackenford to the north of Crediton and west of Tiverton. The modern agriculture of this region is predominantly pastoral agriculture. The pollen sites all lie on Upper Carboniferous Bude Formation which comprises thick, massive sandstone beds with subordinates of mudstones and shales, known locally as the Culm Measures (Durrance & Laming, 1985). The site at Middle North Combe (SS88391592, 223 m OD) is a small spring mire (c. 30 m wide) resting on the east-facing slope of an incised headwater tributary of the Little Dart river in the north of Templeton parish (Figures 1 and 2). The cause of peat initiation at the site is unclear, but is most likely related to a small translational slide that resulted in a shallow depression where paludification occurred. Grainger & Harris (1986) describe the incidence of such landforms on the Carboniferous mudrocks in the South West, and argue that artesian groundwater pressures on the base of silty soils cause the initiation of shallow translational slides that may develop into shallow flowslides where conditions are favourable, that is where the silty soils overlie pervious weathered rock. The site is situated well within an area of historic landscape whose character suggests is of medieval origin.

The site at Hares Down (SS 84712113, 242 m OD) lies within the Knowstone and Hares Down SSSI, and comprises a narrow valley mire (between 5 and 15 m wide, and around 200 m long) draining into the Sturcombe River (Figure 2). The pollen core is taken from the lower end of the site, which ends when the stream draining the site becomes permanent at which point it incises up to 2 m into bedrock. The Knowstone and Hares Down SSSI presently comprises an area of open common land, across which an extensive relict field system is preserved. The relict landscape is of the same form as, and

represents a continuation of, the still-functioning historic landscape whose character is indicative of a medieval origin, suggesting that until recently the Hares Down site lay within a settled and farmed agricultural landscape. The present vegetation structure on the common is heterogenous, and includes patches of dry acidic grassland dominated by *Molinia caerulea, Agrostis tenuis* and *Festuca ovina* on the better drained soils, and wet heath dominated by *Calluna*, with *Erica cinerea, Erica tetralix* and *Molinia caerulea*. The site is characterised by *Molinia* with *Carex panicea, Carex nigra, Carex pulicaris, Carex echinata* and *Eriophorum angustifolium*.

The sites at Lobbs Bog (SS86102026, 254 m OD) and Windmill Rough (SS85462074, 259 m OD) are valley mires which lie in adjacent valley heads on Rackenford Moor (Figures 1 and 2), close to the Knowstone and Hares Down SSSI, and bounded by a series of improved fields and coniferous plantations. The sites are located at the margin of the medieval historic fieldscape, adjacent to an area characterised by post-medieval enclosure. The vegetation adjacent to the sites is fairly homogenous in structure. *Molinia caerulea* tussocks dominate, and support a rich herbaceous flora. Areas between these tussocks are characterised by *Carex echinata, Carex palustre* and *Carex nigra*, while in the wettest areas *Salix cinerea* scrub has developed. The sites themselves are dominated by *Carex paniculata* and *Molinia* tussocks.

The stratigraphy of the sites was investigated using a standard Russian-style corer (Jowsey, 1966), and the sites were sampled using a 5 cm wide Russian-type corer. Pollen analysis was undertaken at 4 cm intervals for each core using 0.5 cm slices of peat; pollen preparation followed standard procedures (Faegri *et al*., 1989). Pollen and spores were identified using the keys in Moore *et al*. (1991), Andrew (1984) and the University of Exeter reference collection, to a minimum sum of 500 land pollen grains.

Results are shown as percentage total land pollen for land pollen types, and percentage land pollen and spores for spores. Pollen nomenclature follows Bennett (1994); differentiation of Poaceae and cereals types follows Andersen (1978). Samples of peat 2 cm thick were used for AMS dating of the sequences; samples were submitted to the Radiocarbon facility at Waikato, New Zealand, with a single sample submitted later to the facility at BETA radiocarbon, Miami, USA. Four dates were submitted from Middle North Combe, four dates from Hares Down, four dates from Lobbs Bog and three dates from Windmill Rough. Dates are expressed as uncalibrated BP, while calibrated age ranges (to 2 sigma) are also provided in the discussion using the Calib 4.3 program (Stuiver & Reimer 1993), and expressed as years cal AD/BC.

Results

Stratigraphy of sites

The stratigraphy of Middle North Combe (Figure 3a) shows the development of the site, presumed to be developing over a translational slide. The basal sediments comprise organic silts at the top end of the site, which are intercalated with a monocotyledonous peat. At the bottom of the site an organic silt unit is overlain by gyttja. Monocotyledonous peat overlies both the organic silt at the top of the site and the gyttja at the base of the site, and comprises the remaining stratigraphy, with a maximum depth of 1.35 m.

The sediments at Lobbs Bog show the development of the valley mire (Figure 3b). The underlying profile of the site is a shallow valley floor (c. 30 m wide) which steps up to the valley sides. The earliest organic sediments are a gyttja which develops across the base of the site on top of a stiff blue-grey clay. A monocotyledonous peat is developed above the gyttja which expands beyond the margins of the

valley floor and up the valley sides. The depth of organic deposits are up to 2.0 m. Two further stratigraphic transects were made across the site, which showed a similar stratigraphic development.

Windmill Rough shows a similar basal profile to Lobbs Bog, although on a smaller scale (Figure 3c). However, gyttja is not developed at the base of the site, and the stratigraphy comprises monocotyledonous peat throughout, with the exception of a narrow lens of organic silt in the deepest core, which is around 1.6 m deep. Three other transects were made across the site which show a similar stratigraphy, although the organic silt lens is not recorded in these sequences.

The stratigraphic analysis at Hares Down comprises a series of transects across the long narrow site. The site has a step-basin form with narrow (c. 2-4 m), steeper sections grading into wider (c. 10-15 m) flatter basins. There are several individual basins down the site which makes correlation of sediments down a long transect impossible. The transect shown (from which the sample core is taken) is representative of the stratigraphy of these basins, and comprises monocotyledonous peat overlying an organic silt at the deepest cores, and a stiff blue-grey clay towards the edge of the site.

Radiocarbon dating results

Results of the radiocarbon dates are shown in Table 1 and time-depth series have been constructed using these data and the historically dated pine rise *c.* AD 1800 also recorded in the sequences. Although the dates for the sites are generally acceptable, there are several problems from the sites at Hares Down and Lobbs Bog that need to be addressed. The basal two dates at Hares Down (2250±50, Wk-11321 and 2360±40, Wk-11322) are indistinguishable at 2 sigma standard deviation: this makes construction of a chronology at the base of site problematic.

By comparison with the *Pinus* rise and other radiocarbon dates in the sequence, two dates from Lobbs Bog (LB3: 1330±50, Wk-11316 and LB4: 730±50, Wk-11317) appear to be too old by around 500 years . These dates had been performed on 2 cm bulk samples. Sample LB5 was subsequently submitted as a test on these dates, and was performed on *Carex* sp. seeds picked from a 2 cm thick peat sample. This date, of 730±50 at 70-72 cm depth is in broad agreement with both the lower two dates and the date of the *Pinus* rise, and so the dates from LB3 and LB4 are therefore rejected as too old. The cause of this is most likely to represent contamination of the bulk samples by the inwash of older soil material onto the site, through the phase of increased arable production in fields adjacent to the site (which is discussed later). This appears to have led to the systematic ageing of the bulk samples, in this example by around 500 years.

Synthesis of pollen results (all sites)

Early to Middle Iron Age (2800-2400 BP)

The earliest data for the study area cover the later prehistoric period (zones MNC lpaz1, HD1 lpaz1, LB1 lpaz1 and WR1 lpaz1; Figures 4, 5, 6 and 7). The pollen zones that cover the period 2800-2400 BP clearly indicate a predominantly open landscape. At Lobbs Bog and Windmill Rough herbaceous species account for around 80% TLP, dominated by sedges and grasses, with a rich herbaceous flora, including types such as Asteraceae, Cardueae, *Centaurea nigra*, *Galium*, Lactuceae, *Potentilla*, *Plantago lanceolata*, *Ranunculus* and *Succisa*. The data from Hares Down and Middle North Combe are dominated by local woodland, namely *Alnus* (between 30 and 50%), although they show a similar open grassland landscape beyond this local woodland. Other woodland taxa are recorded at low levels in all diagrams during this period, notably *Quercus* and *Corylus*, the two types together

representing around 10 to 15% TLP through the period. Low levels of *Calluna* are recorded at Lobbs Bog, Windmill Rough and Hares Down during this period.

Late Iron Age to early Medieval (2400-1350 BP)

The most significant change recorded in the pollen diagrams during the late prehistoric period is at Hares Down and Middle North Combe, which characterised the start of zones MNC2 lpaz2 and HD1 lpaz2. At both sites there is a significant decline in *Alnus*, down to levels around 10 to 15% TLP from levels around 40% TLP. At Middle North Combe this decline is associated with an increase in herbaceous taxa, notably Poaceae and associated grassland herbs, and herbaceous species characteristic of fen-type environments (e.g. Cyperaceae and *Filipendula*). At Hares Down the decline in *Alnus* is associated with a rise in Cyperaceae and herbaceous taxa associated with species-rich grassland (e.g. Cardueae, *Centaurea nigra* and Lactuceae). The other two diagrams, Lobbs Bog and Windmill Rough, do not show any significant change at this time, and are characterised by open species-rich grassland. *Quercus* and *Corylus* continue to be recorded throughout the diagrams in levels similar to preceding zones.

In the Hares Down diagram there is a further *Alnus* decline dated to around 2150 BP (the start of zone HD1 lpaz3). The decline is associated with a small peak in *Calluna*, although the herbaceous assemblage remains constant, with small increases in types such as Cardueae, *Centaurea nigra* and *Potentilla*. At Lobbs Bog there is a slight decline in *Alnus* at around 1700 BP (the start of zone LB1 lpaz2), which is associated with small increases in grassland herbaceous taxa, and a significant peak in Lactuceae in the zone. Other than these changes, the vegetation around the pollen sites is recorded as stable through the end of the prehistoric period until around 1350 BP.

Early Medieval to early post-medieval (c.1350 –500 BP)

At around 1350 BP all diagrams show significant changes in the vegetation around the sites (zones MNC2 lpaz2b, HD1 lpaz4, LB1 lpaz3 and WR1 lpaz2). At Middle North Combe, Lobbs Bog and Windmill Rough the change is characterised by the start of significant curves for cereal types, notably *Avena*/*Triticum* type and *Secale cereale* type (*sensu* Anderson, 1978). At Lobbs Bog these taxa reach levels of around 2% TLP each. At Windmill Rough *Secale cereale* is recorded at levels up to 5% TLP. At Middle North Combe *Avena-Triticum* type is recorded at up to 5% TLP and *Secale cereale* at up to 4% TLP. In these three diagrams there are significant levels of herbaceous taxa associated with arable cultivation (*sensu* Behre, 1981), notably *Anthemis* type. *Hordeum* type (*sensu* Anderson, 1978) is also recorded from these three diagrams from around 1350 BP onwards. Although the *Hordeum* type group contains cultivated species (e.g. *Hordeum vulgare*) it also includes grasses characteristic of wet flushes and fens, such as the *Glyceria* group and consequently it is a less reliable indicator of arable cultivation. At Windmill Rough, and to a lesser extent, Lobbs Bog, the increase in cereal indicators in the diagrams is also associated with an increase in species characteristic of fen environments (e.g. *Filipendula*, *Hypericum elodes*, *Menyanthes trifoliata* and *Potamogeton*), lending further caution to the interpretation of the *Hordeum* type as an arable indicator.

Hares Down does not record a constant cereal curve until around 1000 BP, although around 1350 BP there is a further decline in *Alnus* around the site. At Hares Down there is also an increase in *Calluna* at 1350 BP, which is also recorded at Windmill Rough and Lobbs Bog, where it reaches up to around 10% TLP. During the period 1350 to 500 BP all sites continue to record strong indicators of species-rich grassland, and Poaceae and Cyperaceae are without exception the dominant taxa recorded, along

with herbaceous taxa including Cardueae, *Centaurea nigra*, Lactuceae, *Potentilla*, *Plantago lanceolata* and *Ranunculus*. *Quercus* and *Corylus* continue to be recorded in similar levels to the earlier zones at Lobbs Bog and Windmill Rough, and there is a slight decline in levels at Hares Down. At Middle North Combe *Quercus* and *Corylus* show a pronounced decline, down to levels around 1 and 2% TLP respectively.

Post-medieval and Modern (500 BP – present)

The post-medieval period is characterised by a general decline in arable cultivation (zones MNC2 lpaz5 and lpaz6, HD1 lpaz5, LB1 lpaz5 and lpaz6 and WR1 lpaz3 and lpaz4). The dating evidence for the decline of cereals is less clear than the start of arable cultivation, but falls somewhere in the period 500 – 250 BP. All diagrams indicate the continuation of pastoral land management, with Poaceae dominating the Middle North Combe and Hares Down sequences, whilst at Lobbs Bog and Windmill Rough Poaceae and Cyperaceae are the dominant taxa. There is a general decline in values of *Corylus* during this period although *Quercus* continues to be recorded at low levels, and increases at Middle North Combe and Hares Down. Two sites (Middle North Combe and Lobbs Bog) also record a small peak in *Pteridium* shortly after the decline in arable indicators. There is a low rise in *Pinus* towards the top of all four diagrams indicating that peat growth continued into the last two centuries.

Interpretation and Discussion

Character of Early to Middle Iron Age landscape

The oldest sediments in the study date to around the Late Bronze Age/Early Iron Age, and are found at Middle North Combe. This period is characterised by an open pastoral landscape (zone MNC1 lpaz1), with little evidence of arable cultivation around the site. Although grains of *Hordeum* t. (*sensu*

Andersen 1978) were recorded, an important *caveat* is that this pollen type includes a wide range of wild grasses, including *Glyceria fluitans* (flotgrass), which is widespread across these types of site. A constant curve for *Hordeum*-type may not, therefore, necessarily reflect arable cultivation, and while it is possible that this evidence indicates cereal cultivation adjacent to the site, it is more likely to reflect on-site wet grass communities. At Hares Down a similar landscape is recorded (zone HD1 lpaz1). Both Hares Down and Middle North Combe record low, but persistent, levels of mixed *Quercus-Corylus* woodland in the immediate landscape. Fyfe, Brown & Coles (2003) have shown that the later Neolithic to Middle Bronze Age was probably the period during which clearance of deciduous woodland was most intensive in the lowlands of the South West, and at Bow, to the south-west of the present study in mid-Devon, woodland was reduced to very low levels by the time peat accumulation began at 2220±60 BP (395-100 cal BC, Caseldine *et al.*, 2000).

Although there is general consensus between the palaeoecological sequences around Rackenford, indicating an open pastoral landscape by the Early Iron Age, there are significant differences between the sequences that allow a more detailed understanding of the topographic variation in vegetation during the Bronze Age and Early Iron Age. The sites located in steeper-sided valleys, with incised channels into the local geology (Middle North Combe and Hares Down), are dominated by *Alnus*. These steeper valley locations may have been more marginal for pastoral activities, and poorly-drained valley-side soils may have favoured development of stands of *Alnus* (McVean, 1953; Bennett & Birks, 1990), which swamped the pollen record. In contrast, Lobbs Bog and Windmill Rough are located on more subtle topography, and the pollen sequences are dominated by Cyperaceae rather than *Alnus* (zones LB1 lpaz1 and WR1 lpaz1). The gentle topography is more likely to have been conducive to clearance and grazing through prehistory, and it is likely that these areas would have been fully open by the start of

the Iron Age, and as a consequence the vegetation in the vicinity will have been dominated by a grassland flora.

Mixed *Quercus-Corylus* woodland is evident in all the pollen sequences from this period, although it is better represented at Middle North Combe and Hares Down, which suggests that mixed *Quercus-Corylus* woodland is more abundant in lower valley contexts. It is possible that the lower areas of the landscape with distinct topographic variation would have suited woodland management practices such as coppicing or timber production, although there is no evidence for such practices in the pollen record. Evidence from charcoal analysis at two Roman-period industrial sites on Exmoor does indicate woodland management by the 2nd century AD although there is no direct evidence for this from earlier periods, or from other sites in the South West (Gale, 2003).

Nature and character of changes in Middle to Late Iron Age

During the Middle to Late Iron Age there is a marked change in the vegetation sequences at both Hares Down and Middle North Combe (the start of zones MNC2 lpaz2 and HD1 lpaz2). Both sites record a significant decline in *Alnus*, at 2360±50 BP (540-260 cal BC) from Hares Down, and shortly before 1930±60 BP (Wk-9648) from Middle North Combe. Associated with this decline in woodland taxa is a general increase in the level of species-rich grassland indicators, and species characteristic of fen-edge environments. At Middle North Combe the decline in *Alnus* is also accompanied by a decline in *Quercus* and *Corylus*, suggesting a loss of mixed deciduous woodland as well as clearance of *Alnus* from around the site. There is no clear woodland decline around Lobbs Bog or Windmill Rough, although the character of the Early Iron Age landscape suggests that woodland may not be locally present as at Hares Down or Middle North Combe. Despite the decline in tree pollen at Middle North

Combe and Hares Down woodland is not totally cleared: all sites indicate low levels of *Quercus-Corylus* woodland persisted in the study area well into the later Iron Age and beyond. There is no evidence of a shift to arable cultivation, or changes in the management of the landscape from the environmental data – rather, continuity of pastoral activities appears to characterise the landuse throughout the late prehistoric period.

The most likely mechanism for the decline in alder woodland around Hares Down and the loss of *Alnus* and mixed deciduous woodland around Middle North Combe is clearance resulting from increasing population or economic pressures on the landscape during the Iron Age. Within Britain as a whole the evidence for settlement increases dramatically with the transition into the Middle to Late Iron Age (Haselgrove, 1999), which is generally thought to reflect a rising population, and there is abundant evidence to suggest colonisation of more marginal environments and woodland clearance, suggestive of breaking in new ground. Later Iron Age woodland clearance is a common feature across northern and western Britain, being recorded in Cumbria (Dumayne & Barber, 1994; Wimble *et al*., 2000), Lancashire (Mackay & Tallis, 1994), Wales (Turner, 1964), Shropshire (Leah *et al*., 1988) and southern Scotland (Tipping, 1994; 1995). It is clear that the landscape around the study area in mid-Devon was already within an agricultural system and the evidence from the Rackenford sites strongly suggests increasing pressure on land resources, with clearance of what were likely to be more marginal areas (*i.e.* damp valley-side woodland) within an already economically productive landscape.

Little is know from excavation about the economy and settlement of Iron Age communities of lowland mid-Devon and the (sparse) evidence for dated Iron Age settlement from the surrounding region is concentrated into the latter half of the period. On-site evidence from charred plant remains suggest local

cultivation around the few excavated settlements, with grassland beyond these cultivated areas (e.g. the Blackhorse enclosure, Long Range and Langland Lane enclosures in East Devon: Fitzpatrick *et al*., 1999).

Impact of Romanisation and the early post-Roman period

Such is the extent of regional variation in the character of Roman Britain that there can be no 'typical' Romano-British landscape. In the South West the relative lack of 'Romanisation' and absence of the villa economy beyond a line between the Quantock-Blackdown Hills and the immediate hinterland of the *civitas* capital at Exeter suggests that there was no radical change in landscape character. There is very little evidence in any of the four environmental sequences in this study to suggest changes in the character of the vegetation or landscape from the later Iron Age through to the post-Roman period (Figures 4, 5, 6 and 7: pollen zones MNC lpaz2, HD1 lpaz2, LB1 lpaz2, WR1 lpaz1). All sites suggest that the general character of the local vegetation is unchanged, reflecting a broad continuity of pastoral landuse, presumably with some arable cultivation, which is not recorded in the pollen sequences owing to their landscape position. There was no extended woodland clearance recorded during this period, comparable to that recorded at the start of the Roman period in northern England (Dumayne & Barber, 1994).

This apparent continuity is significant for several reasons. First, it implies that Roman imperial rule did not alter the character of the local agricultural system within mid-Devon. Roman military presence is undisputed in the South West (Fox, 1964; Maxfield, 1991; 1999), though military occupation at Exeter (25 kilometres to the south of Rackenford) ceased around AD 74 to 78, and although at least six forts or fortlets have been located within Devon, they were certainly not all occupied at the same time. This

Roman military presence in the South West at the start of the Roman period may have placed pressure on the local resources but it appears that this did not lead to an increase in cereal cultivation in mid-Devon. It is likely that supplies for this Roman presence would have been sourced from closer to Exeter, such as the more productive lower Exe valley located on a fertile tongue of Permian sandstone immediately to the north of Exeter, the area which subsequently saw some evidence for Romanisation in the form of possible villas at Crediton and Thorverton (Griffith & Quinnell, 1999). By AD 80 the military garrison in the South West was relocated to Wales and strengthen the campaigns in the North. Within lowland Devon excavated rural structures dating to the Romano-British period are rare, but these follow the later Iron Age tradition, and few show evidence of Romanization (e.g. Simpson *et al*., 1989).

If any impact of the start of Roman imperial rule on landuse in the Rackenford area is palynologically invisible, the decline of the Roman Empire and withdrawal of Roman control in the fourth century AD is equally unremarkable. The pollen sequences suggest continuity of landuse practices throughout the Roman period and in the immediate post-Roman period. This pattern is in broad agreement with the evidence from the Somerset Levels, where the sequence at Meare Heath suggests a strong agricultural tradition continuing in the post-Roman period (Beckett & Hibbert, 1979). In contrast, the blanket peat sequences on the higher uplands of Exmoor suggest a decline in the intensity of land use (Merryfield & Moore, 1974; Francis & Slater, 1990). The continuity of land practices from Rackenford clearly demonstrates that these upland blanket mire sequences do not reflect some broad, regional decline in the agricultural landscape of the South West.

Expansion of convertible husbandry in mid-Devon

Although there is little evidence of changes in the landscape during the immediate post-Roman period, there are significant developments in the character of land-use in the study from 1350 BP (around cal AD 600-800), notably a dramatic increase in cereals, a continued strong pastoral element suggesting good quality grazing, and an increase in *Calluna* suggestive of rough grazing on the more marginal landscape areas. *Secale cereale* and *Avena/Triticum* type are recorded at Lobbs Bog shortly before 1240±50 BP (cal AD 670-890). At Windmill Rough the rational limits of *Secale cereale* and *Avena/Triticum* type are recorded shortly after 1380±50 BP (cal AD 560-770). The shift to arable cultivation is most pronounced at Middle North Combe, and although the rational limit is undated, it lies before 900±80 BP (cal AD 1010-1280), and by interpolation around 1350 BP (between AD 600 and 800). Although cereal cultivation is also recorded at Hares Down, the start of cultivation is significantly later, at 1080±50 BP (cal AD 860-1030). The levels of cereal pollen recorded suggest very significant cultivation around all sites, although a wholesale shift to arable agriculture is too simple an explanation for the changes described as the period is also characterised by two other major land-use indicators that at first sight are not compatible with the increase in arable: an expansion of *Calluna* and the continuation of grassland communities typical of pastoral activities. The expansion of *Calluna* is exemplified at Lobbs Bog (the start of zone LB1 lpaz3, Figure 5), indicating the development of heath vegetation near the sites. It is unlikely that *Calluna* is growing on the sites as the stratigraphy suggests that Cyperaceae dominated the on-site vegetation. The development of *Calluna*-heath around Lobbs Bog and Windmill Rough, sites which are located in the higher part of the local landscape, suggests the establishment of a "common" or rough grazing area outside that used for more intensive forms of agriculture. The site at Middle North Combe does not reflect any increase in *Calluna* at this time which is not surprising as that site is located well within an area whose historic landscape is characterised by documented medieval settlements and field systems designed for more intensive agriculture.

The continuation of pastoral indicators, in particular a rich grassland flora (including *Centaurea nigra*, *Plantago lanceolata*, Lactuceae and *Potentilla* t.), throughout this phase clearly indicates that pastoral activities continue to be important through the medieval period in the study area. Woodland is also present throughout this arable expansion and the subsequent mixed-agricultural phase, and with the exception of Middle North Combe, the extent of woodland in the landscape is not reduced with the shift of agricultural system.

These factors point to an agricultural regime that develops (or is introduced) between AD 600 and AD 800, and lasts until at least AD 1500. Documentary evidence from the latter part of this period (from the 12th century AD on) provides some indication of the nature of this regime (Hatcher, 1988; Fox, 1991). Hatcher (1988) has identified intensive farming practices from the 12th century in the South West which include land enclosure beyond which lay areas of rough grazing. Documentary sources also show that by AD 1350 a distinctive form of agriculture was practiced in the South West, known as convertible husbandry (Fox, 1991; 1993). In this system the majority of fields were subject to alternating grain and grass crops, often with a long grass ley. Little land would have been permanent grassland in this system, although it is likely that floating meadows and woodland would not have been ploughed. Outfield pasturing, combined with folding animals into infields to introduce nutrients from the outfield, would have enhanced soil fertility, along with practices such as burn-beating (the burning of the turf before ploughing). Convertible husbandry allowed flexibility in yields: since only 26 to 51% of land was under arable cultivation at any single time (Fox, 1991), during periods of increased population or economic pressure, shortening ley periods would have led to increased yields. Conversely, during periods of lower population, lengthened ley periods would have prevented excess production.

This documentary evidence allows a model of the mixed arable and pastoral landuse represented in the environmental evidence from the Rackenford Moor and Middle North Combe sites to be developed, based in the late medieval/early post-medieval period when convertible husbandry is documented. Despite the rotational system of alternate grass and arable cropping, the pollen sequences show a continuous curve of arable indicators owing to the nature of the sampling (Figure 8). Figure 8 represents a schematic model for clarity, with 4 years of pollen accumulation in each 0.5 cm slice. In reality the 0.5 cm samples used in this study represent between 5 and 10 years pollen accumulation and during this period all the fields adjacent to the pollen sites will have had an arable crop on them at some stage, leading to the high representation of cereals and arable indicators. The intervening ley periods will similarly result in constant pastoral indicators. The lowest-lying site, Middle North Combe, lay well within this landscape of convertible husbandry where the majority of woodland had been cleared. Lobbs Bog and Windmill Rough, in contrast, were closer to the upland limits of cultivation and so in addition to the arable and pasture signature of convertible husbandry also contain the pollen of the *Calluna*-dominated heathland of the commons and outfield beyond, along with some permanent oak/hazel woodland – a vital resource through the medieval period. Compared to these three sites, Hares Down does not record cereal cultivation until several centuries later. It is likely that this area of the landscape was unenclosed land which provided rough grazing and other resources such as gorse and furze for fuel, bedding and fodder for animals. The expansion of the system of convertible husbandry onto Hares Down may reflect a small intake of waste land for new settlement around the eleventh century AD. The lack of change in the nature of the environmental evidence between AD 800 and AD 1350 strongly suggests that convertible husbandry, as a distinct agricultural system, emerged in mid-Devon around AD 600-800.

If the results described for mid-Devon do represent the start of the regionally distinctive South Western system of convertible husbandry and its associated landuses, then theories concerning the development of other types of medieval landscape in the late 1st millennium AD, and in particular the 'village zone' of the midlands and eastern England, may require further examination. It has been assumed that the midlands-style landscape evolved from the dispersed settlement pattern around the 9th century AD as a discrete phenomena (Lewis *et al.* 1997; Taylor, 1983; Williamson, 2003), although it may be possible that this midland system was in fact just one of several regionally distinct landscapes emerging in the late 1st millennium AD, another example being East Anglia (Williamson, 2003).

The contrast between the upland and lowland sequences

Traditionally, the main lines of evidence for the environment of South West Britain have been the upland blanket mire sequences on Dartmoor (Caseldine, 1999) and Exmoor (Moore *et al*., 1984; Francis & Slater 1990; 1992), which have been extrapolated to the surrounding lowlands (e.g. Dark, 2000). It is clear from the data presented here, however, that the lowlands had a very different landuse history to the uplands. It appears that mid-Devon was predominately a pastoral region from late-prehistory until around the 8th century AD, a pattern also recognised from the southern upland fringe of Exmoor (Fyfe, Brown & Rippon, 2003). There is no evidence for any decline in pressure on land, especially between the 4th and 6th centuries AD, when the evidence from the higher uplands on Exmoor suggests the abandonment of land, with woodland regeneration at The Chains (Moore *et al*., 1984) and reversion to *Calluna* on Hoar Moor, reflecting a cessation of upland grazing and management (Francis & Slater, 1990). The model from the upland sequences of expansion of arable onto the high uplands in the mid-13th century does not reflect the far more significant emergence of convertible husbandry in the lowlands

around five centuries earlier. This serves to dispel the twin assumptions that upland sequences can be used simplistically as a proxy for lowland areas, and that upland and lowland areas were exploited in a similar fashion throughout the last 2,500 years. This has important implications for our understanding of lowland cultural landscape.

Conclusions

This paper has demonstrated the potential for palaeoenvironmental reconstruction within the lowland cultural landscape of South West Britain owing to the survival of small valley mires. The sites in this paper have been used to highlight the potential of such localised peat deposits to record changing vegetation patterns over the last 2,500 years, and understand cultural changes at the local landscape scale. The value of using multiple small sites, which record individual local vegetation histories, has been shown, and temporal and spatial aspects of wider vegetation and landscape change have been explored. The lowland landscape of mid-Devon was dominated by pastoral activities within a predominantly open landscape by the start of the Iron Age. During the Middle to Late-Iron Age there is a period of increasing pressure on the landscape, leading to the clearance of valley-side *Alnus* woodland. This intensification of landuse is seen throughout western and northern Britain. Land management in the study area is characterised by continuous pastoral activities from the Late Iron Age (and earlier), through the Roman period and into the immediate post-Roman period, which contrasts with earlier studies on the highest uplands on central Exmoor that showed a decline in the intensity of landscape use in the post Roman period.

This continuity of land management and land-use practices in the lowland landscape seen between the Late Iron Age and post-Roman period s came to an end around the seventh to ninth century AD. The

pollen evidence from Middle North Combe, Lobbs Bog and Windmill Rough all show a distinct change from the previously dominant pastoral agricultural system, to a landuse regime characterised by an expansion of cereal types, continued evidence for pastoral activities, and expansion of rough heath. These changes are indicative of a significant shift to a mixed farming system within the lowlands (*i.e.* both arable and pastoral landuse), and is probably associated with the creation of the patterns of field systems that characterise today's historic landscape, beyond which common rough grazing was survived. Documentary sources show the existence of a convertible husbandry system within lowland Devon by the 14th century AD, and the pollen evidence presented here suggests that this system of convertible husbandry originated around the 7th to 9th century AD and continued within the study area until the post-Medieval period.

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Table 1. Results of AMS radiocarbon dating.

	Lab. code	Depth (cm)	Age (BP)	Calibration (2s)	dC13
Lobbs Bog					
LB1	Wk-11314	180-182	2170±50	380-60 cal BC	-29.9±0.2
LB2	Wk-11315	132-134	1240±50	cal AD 670-890	-28.5±0.2
LB3	Wk-11316	80-82	1330±50	cal AD 620-810	-29.2±0.2
LB4	Wk-11317	32-34	730±50	cal AD 1210-1390	-27.8±0.2
LB5	Beta-177886	70-72	730±50	cal AD 1210-1390	-27.4±0.2
Windmill Rough					
WR1	Wk-11318	151-153	2820±50	1130-840 cal BC	-28.1±0.2
WR2	Wk-11319	132-134	1380±50	cal AD 560-770	-28.6±0.2
WR3	Wk-11320	76-78	240±50	cal AD 1490-1949	-28.0±0.2
Hares Down					
HD1	Wk-11321	138-140	2250±60	400-170 cal BC	-28.1±0.2
HD2	Wk-11322	120-122	2360±40	540-260 cal BC	-26.7±0.2
HD3	Wk-11323	92-94	2130±50	360-0 cal BC	-29.0±0.2
HD4	Wk-11324	56-58	1080±50	cal AD 860-1030	-26.2±0.2
Middle North Combe					
MNC-01	Wk-9467	149-151	2860±60	1260-840 cal BC	-28.6±0.2
MNC-02	Wk-9468	129-131	1930±60	60 cal BC–cal AD 240	-31.2±0.2
MNC-03	Wk-9469	113-115	900±80	cal AD 1010-1280	-25.8±0.2

MNC-04	Wk-9470	61-63	490±60	cal AD 1300-1520	-30.4±0.2

Figure 1. Large map showing the location of the study area within Devon, UK, with location map of pollen sites within mid-Devon. The inset shows the location of the study in Britain.

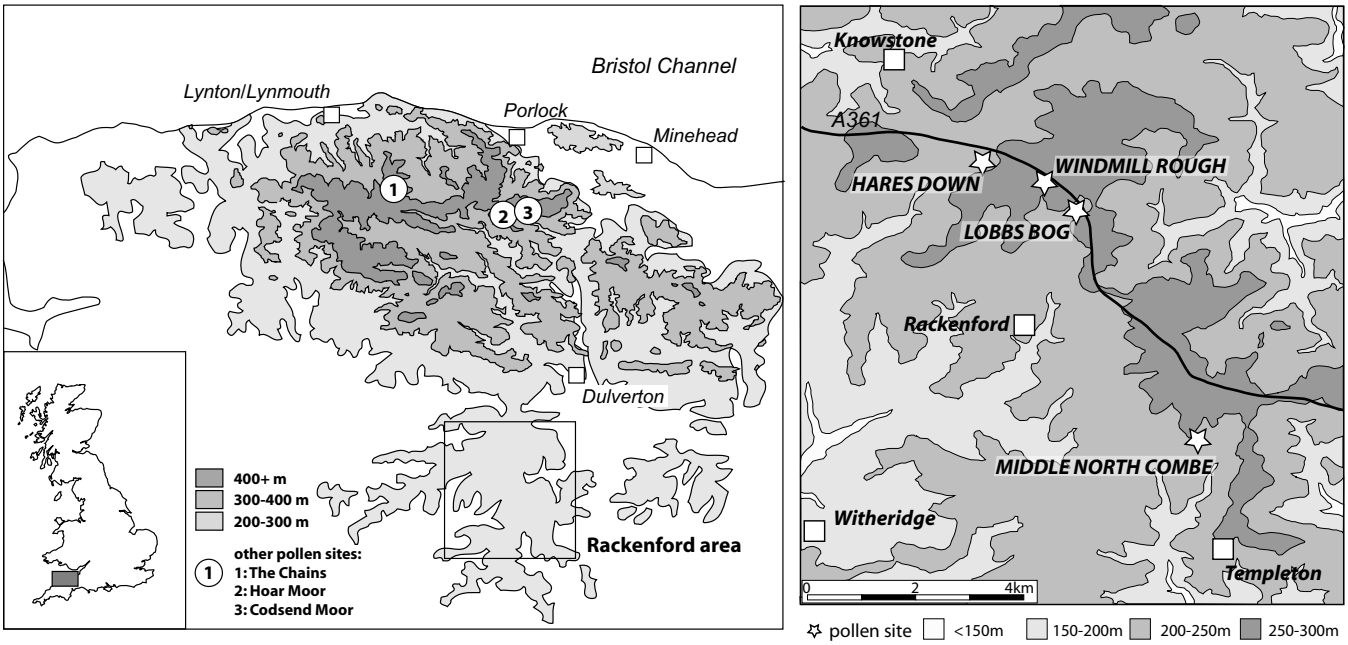


Figure 2. Sketch plan of sites, showing site form, location of cross-section transects in Figure 3 and the relationship between the sites and the historic landscape. A: Middle North Combe, B: Lobbs Bog, C: Windmill Rough, D: Hares Down. Scale bars are 50 m total length.

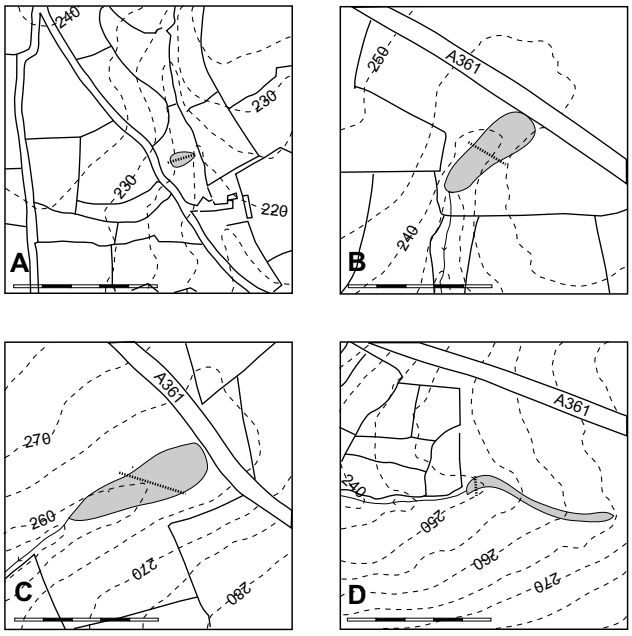


Figure 3. Cross-sectional transects of stratigraphy of sites: A: Middle North Combe, B: Lobbs Bog, C: Windmill Rough, D: Hares Down. Note different vertical and horizontal scales between sites.

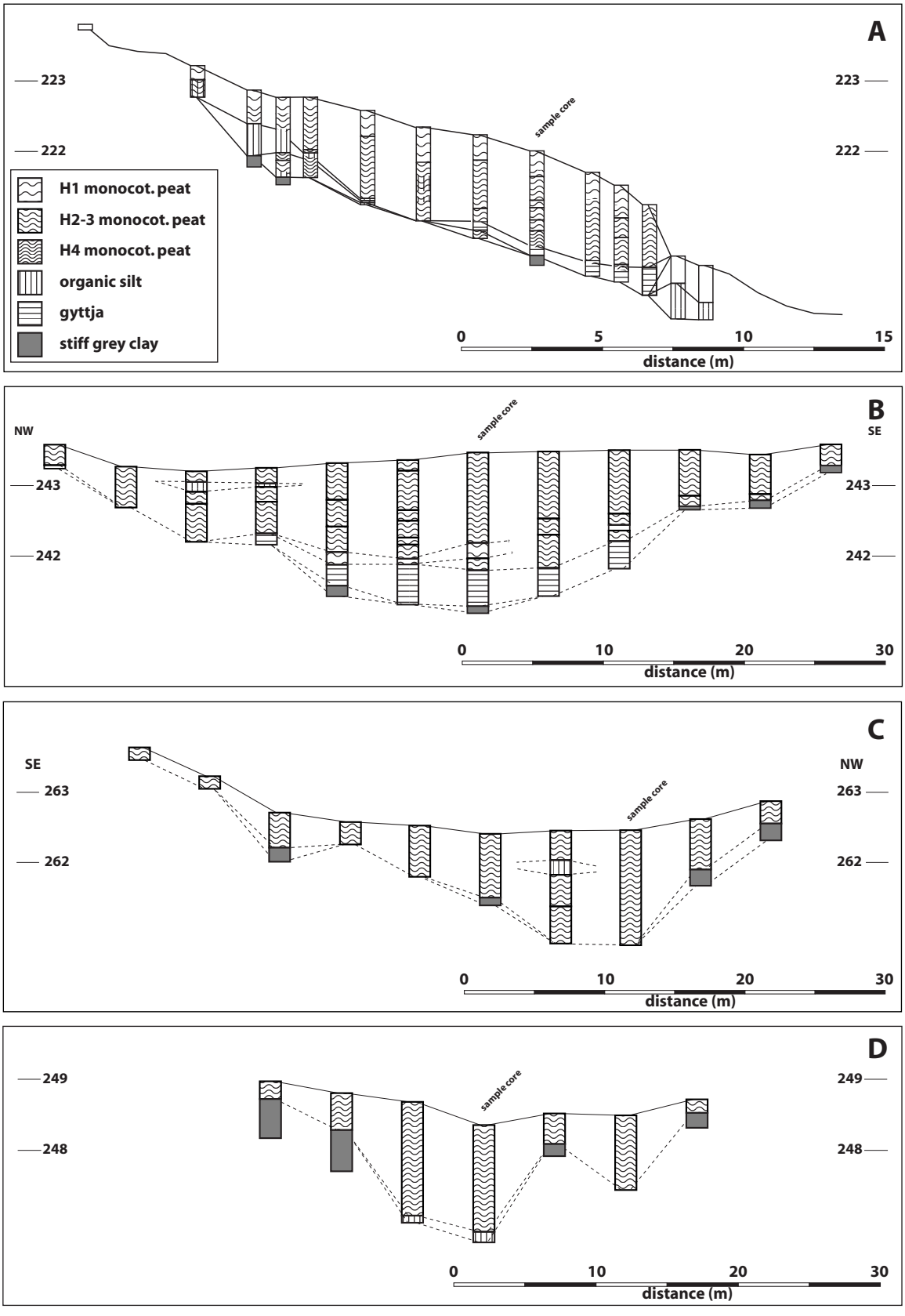


Figure 4. Percentage based (%TLP) pollen diagram from Middle North Combe, showing all identified pollen and spore taxa. Taxa <1% TLP are indicated by +.

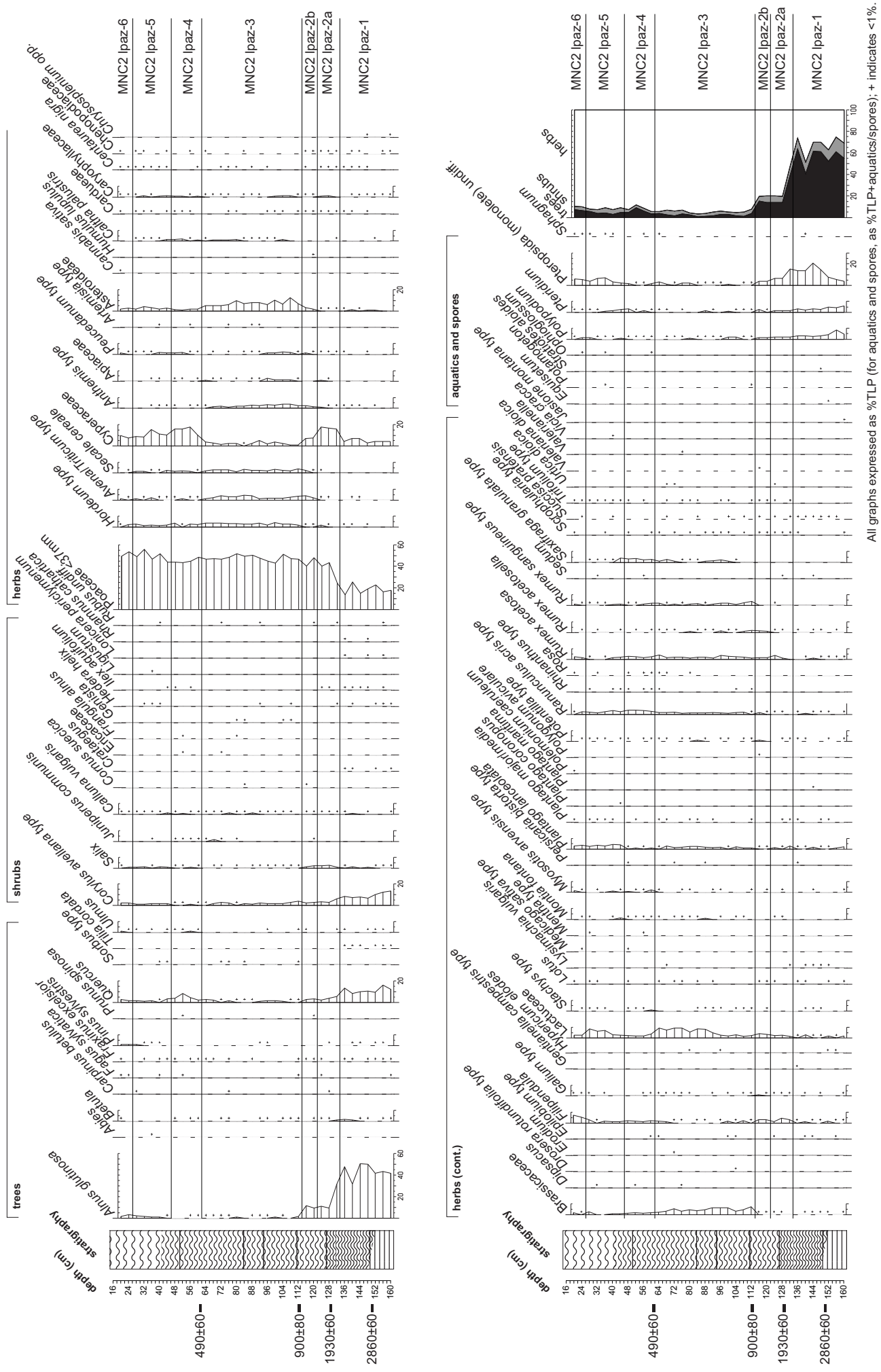
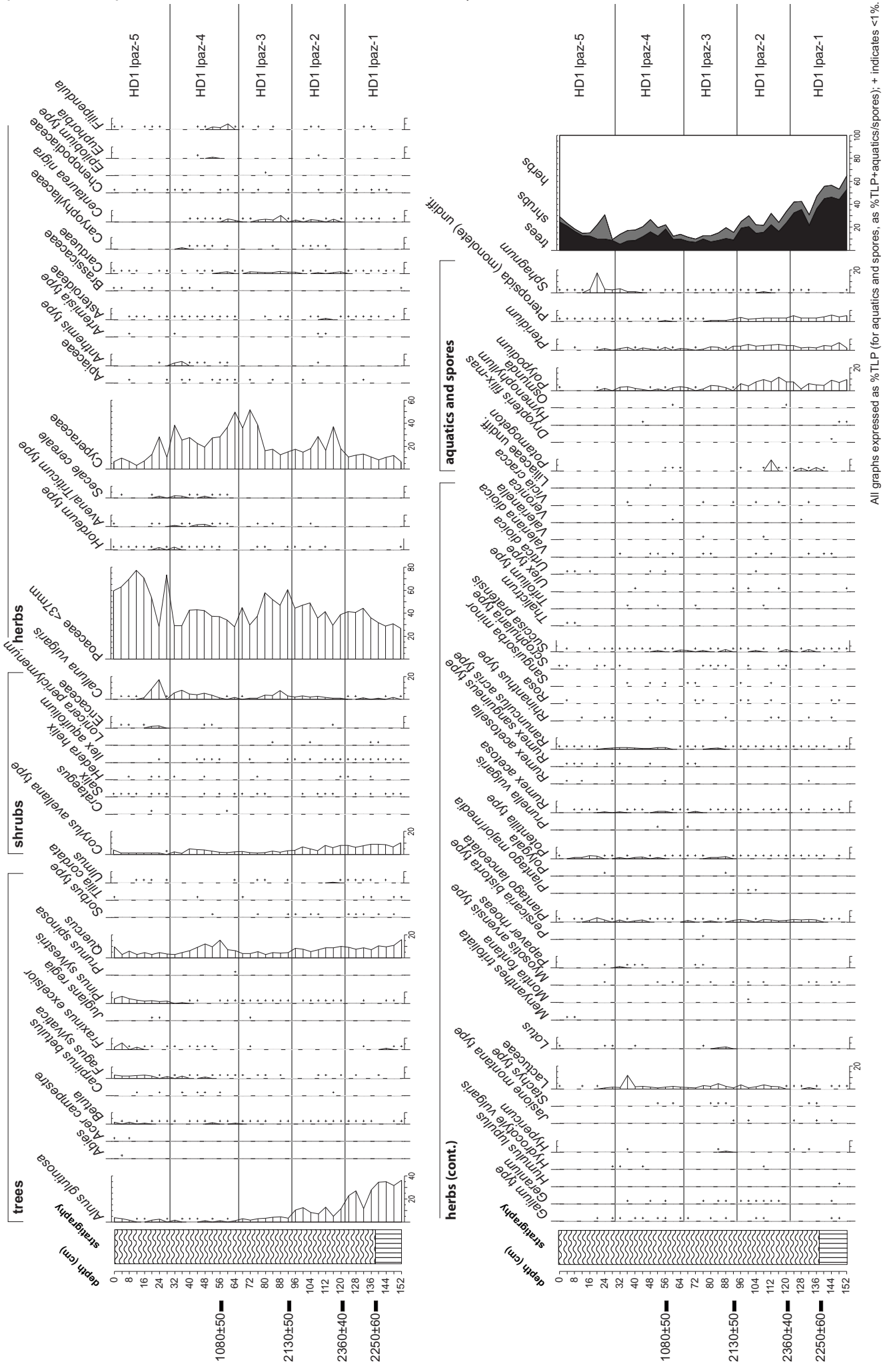
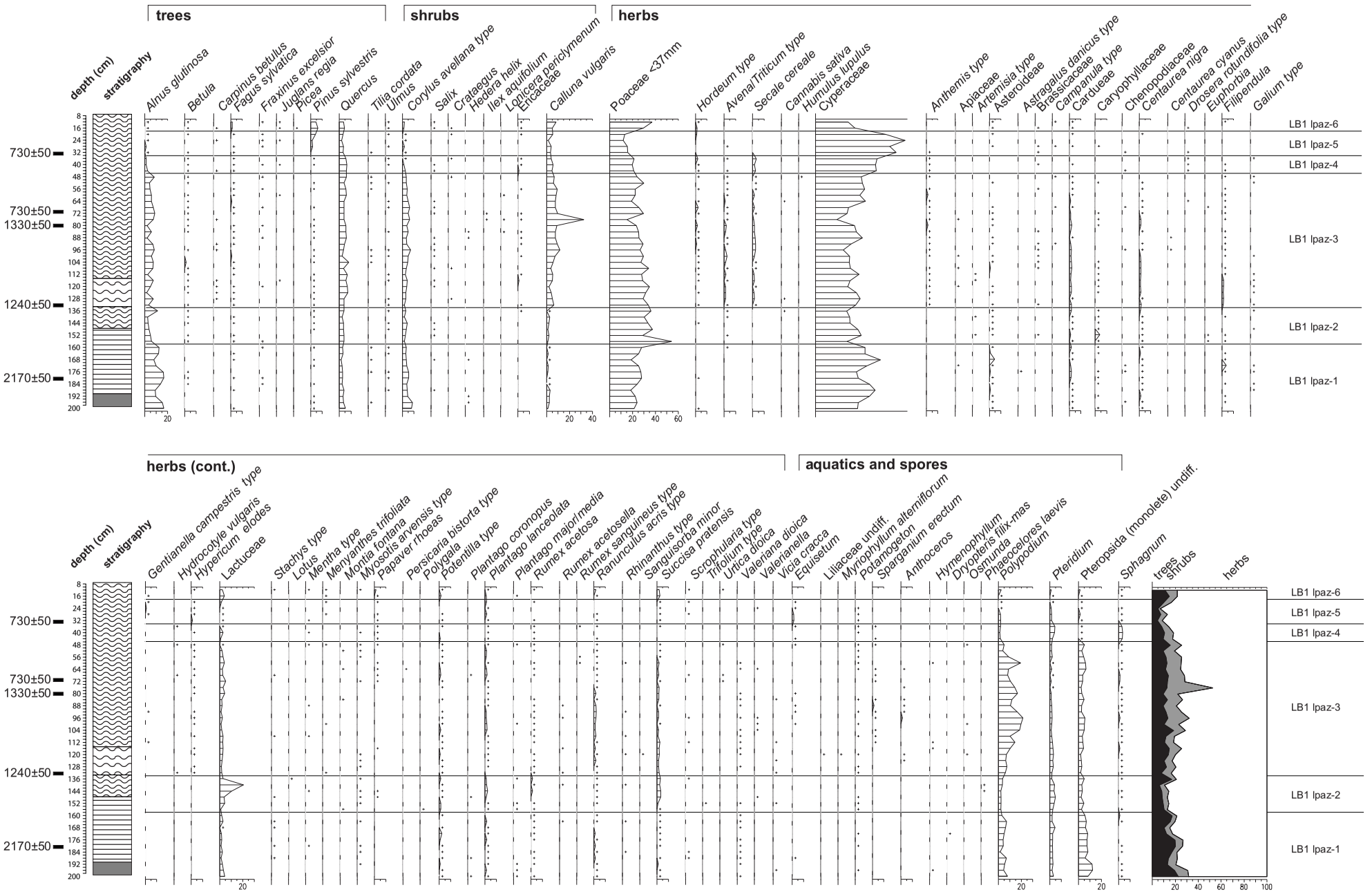


Figure 5. Percentage based (%TLP) pollen diagram from Hares Down, showing all identified pollen and spore taxa. Taxa <1% TLP are indicated by +.





All graphs expressed as %TLP (for aquatics and spores, as %TLP+aquatics/spores); + indicates <1%.

Figure 6. Percentage based (%TLP) pollen diagram from Lobbs Bog, showing all identified pollen and spore taxa. Taxa <1% TLP are indicated by +.

Figure 7. Percentage based (%TLP) pollen diagram from Windmill Rough, showing all identified pollen and spore taxa. Taxa <1% TLP are indicated by +.

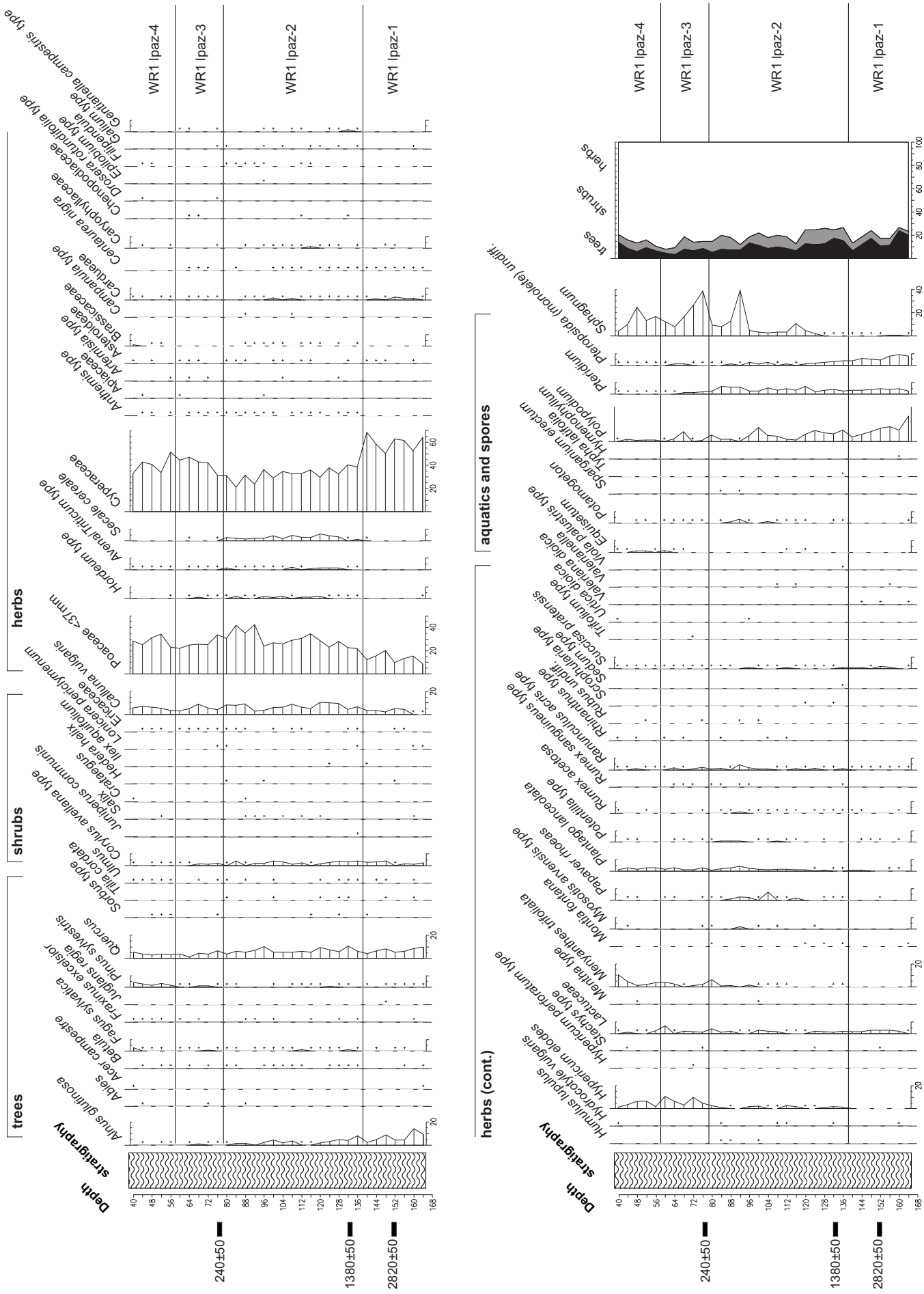


Figure 8. Schematic model of representation of convertible husbandry in pollen sequences. A 0.5 cm pollen sample is taken to represent 4 years of pollen accumulation.